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NATIONAL DAM INSPECTION PROGRAM. LAKEMONT DAM (NDI ID NUMBER PA--ETC(U)
1980 L D ANDERSEN

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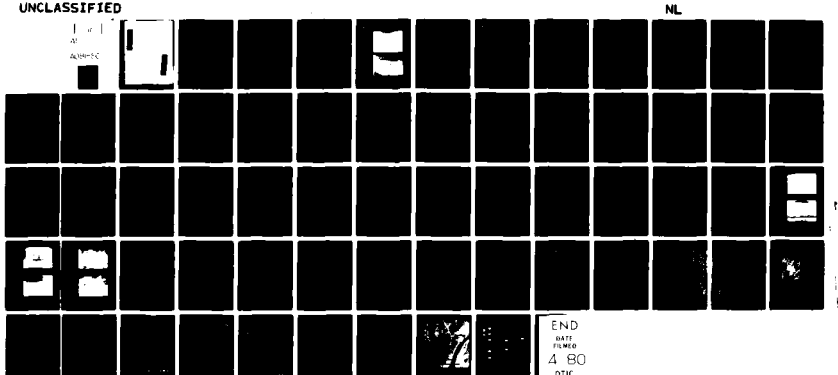


PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Department of the Army, Office of Chief of Engineers, Washington, D.C. 20314.

The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon visual observations and review of available data. Detailed investigations and analyses involving topographic mapping, subsurface investigations, material testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the inspection is intended to identify any need for such studies which should be performed by the owner.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of the dam depends on numerous and constantly changing internal and external factors which are evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The assessment of the conditions and recommendations was made by the consulting engineer in accordance with generally and currently accepted engineering principles and practices.

PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM

NAME OF DAM: Lakemont Dam
STATE LOCATED: Pennsylvania
COUNTY LOCATED: Blair
STREAM: Brush Run, a Secondary Tributary of Frankstown Branch of Juniata River
SIZE CLASSIFICATION: Small
HAZARD CLASSIFICATION: High
OWNER: Blair County
DATE OF INSPECTION: December 5 and 12, 1979

ASSESSMENT: Based on the evaluation of the existing conditions, the condition of Lakemont Dam is considered to be unsafe/nonemergency due to severe structural deterioration on the concrete overflow ogee section of the spillway. The second spillway section consists of a beam and stop log arrangement. This bay also incorporates two discharge gates which are manually operated by a chain pulley mechanism. Although no serious structural distress was observed in this stop log arrangement, the configuration of the structure is not considered to be acceptable as an impounding structure. The main load-carrying beams of the structure are supported by concrete which appears to have questionable strength and both the concrete and the steel beams are subject to deterioration.

In view of these concerns, it is recommended that the lake be immediately lowered to a level below the point of major structural distress on the ogee overflow section, and then be maintained at that level until the spillway structures are examined by a professional engineer and necessary repairs performed.

The flood discharge capacity of Lakemont Dam was evaluated according to the recommended procedure and was found to pass less than 5 percent of the probable maximum flood (PMF) without overtopping the dam. Therefore, according to the recommended criteria, the flood discharge capacity of Lakemont Dam is classified to be inadequate. However, the spillway capacity is not considered to be seriously inadequate because overtopping of the dam, in view of its wide crest width, is not likely to pose a serious breach potential that would significantly increase downstream damage. Nevertheless, the need for increasing the spillway capacity and the ability of the embankment to withstand overtopping should be investigated.

The following recommendations should be implemented immediately or on a continuing basis:

1. The owner should immediately retain a professional engineer for detailed evaluation of the spillway structures and prepare and execute plans for repair or replacement of these structures. In the interim, the lake level should be maintained at a level below the major structural distress on the ogee overflow section.

2. In conjunction with the detailed evaluation of the spillway structures, the need for increasing the capacity of the spillway and the ability of the embankment to withstand overtopping should be investigated.

3. Around-the-clock surveillance should be provided during unusually heavy runoff and a formal warning system should be developed to alert the downstream residents in the event of emergencies.

4. The dam and appurtenant structures should be inspected regularly and necessary maintenance performed.

Lawrence D. Andersen, P.E.
Vice President

January 28, 1980
Date

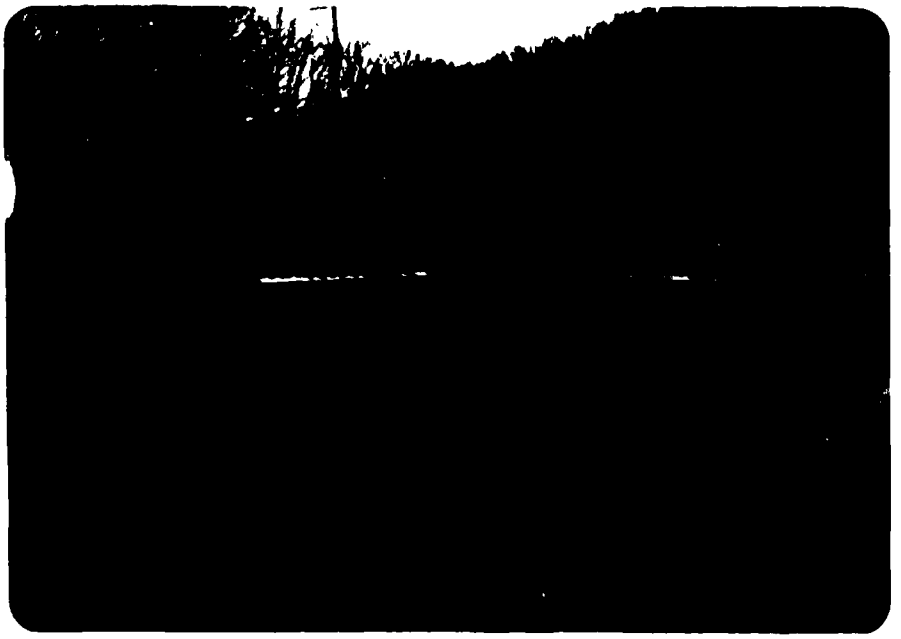
Approved by:

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer

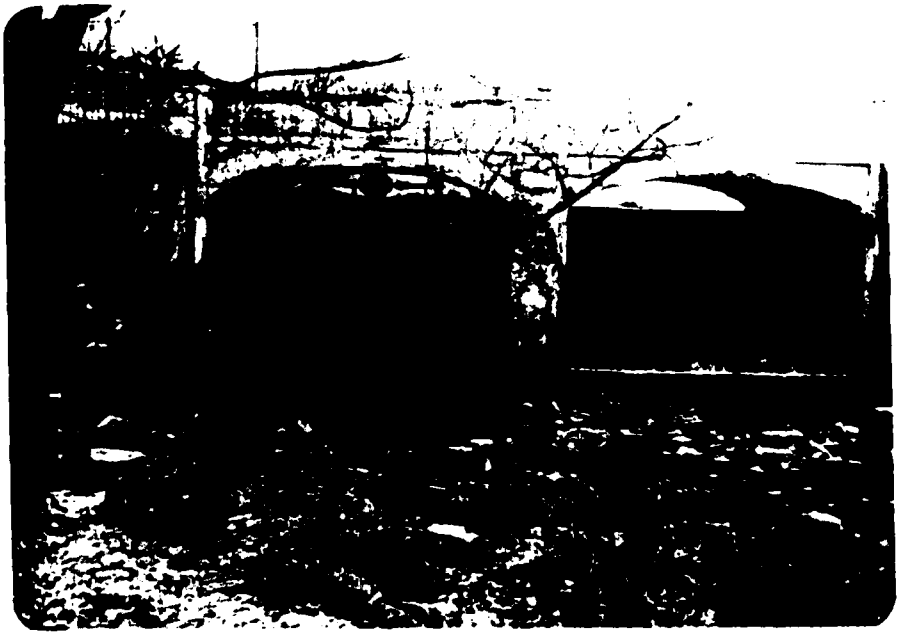
25 Feb 1980
Date

COMMONWEALTH OF PENNSYLVANIA
REGISTERED PROFESSIONAL
Lawrence D. Andersen
ENGINEER
No. 17458-E

LAKEMONT DAM
NDI I.D. PA-528
DECEMBER 5, 1979



Upstream Face



Downstream Face

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(11) 1980 (10) Lawrence D. Anderson

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(6) PHASE I REPORT
NATIONAL DAM INSPECTION PROGRAM.
LAKEMONT DAM CNDI ID Number PA-528,
[redacted] DER ID Number 7-50,
Susquehanna River
Basin, Brush Run, Blair County,
Pennsylvania.
Phase I Inspection
Report,

SECTION 1
PROJECT INFORMATION

1.1 General

a. Authority. The inspection was performed pursuant to the authority granted by The National Dam Inspection Act, Public Law 92-367, to the Secretary of the Army, through the Corps of Engineers, to conduct inspections of dams throughout the United States.

b. Purpose. The purpose of this inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project

a. Dam and Appurtenances. Lakemont Dam is an earth embankment approximately 500 feet long with a maximum height of approximately 12 feet from the downstream toe. Two discharge structures associated with a centrally located two-span reinforced concrete bridge constitute the spillway and outlet facilities for the dam. A concrete ogee overflow section is located under the left bay of the spillway bridge (looking downstream). Under the right bay of the spillway bridge, a structure consisting of steel beams and stop logs and equipped with two manually operated gates constitutes the gated spillway section. Closed conduits with inlet structures on each side of the spillway bridge provide additional spillway capacity. These conduits discharge into the channel under the bridge. As designed, the crests of the ogee spillway, the top of the stop logs, and the conduit spillways are all at the same elevation providing approximately 2-1/2 feet of freeboard to the top of the dam.

The configuration of the dam and the historical records suggest that the dam was originally constructed as a roadway embankment with the spillway structures as a bridge over a stream. The records further indicate that the dam crest and a small embankment approximately 100 feet downstream from the main embankment were used as an end-of-line streetcar turnaround.

b. Location. The dam is located in Lakemont Park, approximately one mile southeast of Altoona in Logan Township, Blair County, Pennsylvania (Plate 1).

c. Size Classification. Small (based on 12-foot height and 93 acre-feet maximum storage capacity).

d. Hazard Classification. The dam is classified to be in the high hazard category. Urban residential areas are located immediately downstream from the dam. It is estimated that failure of the dam would cause loss of life and property damage in these areas.

e. Ownership. Blair County (address: Commissioners of Blair County, Courthouse, Hollidaysburg, Pennsylvania 16648).

f. Purpose of Dam. Recreation.

g. Design and Construction History. No information on the design and construction of the dam is available. Lakemont Park maintenance personnel indicated that the dam was built in the late 1890s.

h. Normal Operating Procedure. The reservoir is normally maintained at the crest level of the uncontrolled spillways. Inflow occurring when the lake is at or above the spillway level is discharged through the uncontrolled spillways.

1.3 Pertinent Data. The elevations referred to in this and subsequent sections of this report were calculated based on approximate field measurements assuming the spillway crest elevation to be at Elevation 1006, which is the lake elevation shown in the U.S. Geological Survey (USGS) Hollidaysburg 7-1/2-minute quadrangle map.

a. Drainage Area	6.2 square miles
b. Discharge at Dam Site (cfs)	
Maximum known flood at dam site	440+ (the dam was overtopped in 1936)
Outlet conduit at maximum pool	Not applicable
Gated spillway capacity at maximum pool	300(1)
Ungated spillway capacity at maximum pool	738(2)
Total spillway capacity at maximum pool	738

(1) Flow through two gates at normal pool level.

(2) Overflow through ogee and stop log section, plus flow-through gates.

c. Elevation (USGS Datum) (feet)

Top of dam	1008.5 (measured low spot)
Maximum pool	1008.5
Normal pool	1006
Upstream invert outlet works	Not applicable
Downstream invert outlet works	Not applicable
Streambed at center line of dam	996.5
Maximum tailwater	Unknown
Toe of Dam	996.5±

d. Reservoir Length (feet)

Normal pool level	1600
Maximum pool level	1800±

e. Storage (acre-feet)

Normal pool level	26
Maximum pool level	93±

f. Reservoir Surface (acres)

Normal pool level	13
Maximum pool level	18±

g. Dam

Type	Earth
Length	500 feet
Height	12 feet
Top width	30 to 150 feet
Side slopes	Downstream: Undefined Upstream: Unknown
Zoning	Unknown
Impervious core	Unknown
Cutoff	Unknown
Grout curtain	Unknown

h. Regulating Outlet. The reservoir has no low-level regulating outlet.

i. Spillway

Type	Ogee weir
Length	17 feet
Crest elevation	1006
Gates	2 gates with openings 4'3" by 3' and 4'3" by 7'4"
Upstream channel	Lake
Downstream channel	Plunge pool

SECTION 2
DESIGN DATA

2.1 Design

a. Data Available. The available data consists of files provided by the Commonwealth of Pennsylvania, Department of Environmental Resources (PennDER). Available information includes state inspection reports and various correspondence. No information on the design and construction of the dam was found.

(1) Hydrology and Hydraulics. No information is available.

(2) Embankment. No information is available on the design and construction of the embankment.

(3) Appurtenant Structures. The available information consists of two drawings illustrating the repairs for the spillway structures conducted in 1963.

b. Design Features

(1) Embankment. No information is available to ascertain the type of embankment and the manner in which it was constructed.

Based on approximate field measurements, the height of the embankment was found to be approximately 12 feet and the crest width varying between 30 feet and 150 feet.

(2) Appurtenant Structures. Plates 2 and 3 illustrate the details of the gated and ungated spillway sections.

d. Design Data. Available information includes no design data for the embankment or its appurtenant structures.

2.2 Construction. No information is available on the construction of the dam. Available records indicated that the dam was constructed by the Altoona and Logan Valley Electric Railway Company. According to maintenance personnel, the dam was constructed during the 1890s. The records indicate that portions of the spillway structures were repaired or replaced during 1963.

2.3 Operation. No formal operating records are maintained for the reservoir. Park maintenance personnel indicated that to their knowledge, the maximum pool level occurred during 1936 when the dam was overtopped.

2.4 Other Investigations. None reported.

2.5 Evaluation

a. Availability. The available information, which mostly consists of correspondence, was provided by PennDER.

b. Adequacy. The available information includes no technical data to assess the adequacy of the design and construction of the dam.

SECTION 3
VISUAL INSPECTION

3.1 Findings

a. General. The on-site inspection of Lakemont Dam consisted of:

1. Visual inspection of the embankment, abutments, and embankment toe.

2. Visual examination of the appurtenant structures.

3. Evaluation of downstream area hazard potential.

The specific observations are illustrated in Plate 4.

b. Embankment. The general inspection of the embankment consisted of searching for indications of structural distress, such as cracks, subsidence, bulging, wet areas, seeps and boils, and observing general maintenance conditions, vegetative cover, erosion, and other surficial features.

In general, the embankment was found to be in good condition with no signs of distress. The only condition which may require attention is the presence of erosion ditches on each side of the spillway bridge. These erosion ditches appear to be caused by surface runoff and pedestrian traffic.

The crest of the dam was surveyed relative to the spillway crest elevation and was found to be relatively uniform. The dam crest profile is illustrated in Plate 5.

c. Appurtenant Structures. The appurtenant structures for the dam consist of a two-span reinforced concrete bridge, with gated and ungated spillways under each of its spans. The concrete in various locations of this structure was found to be seriously deteriorated. In the uncontrolled ogee overflow section, a cavity was found approximately one foot below the crest across the entire 17-foot length of the overflow section. At several locations, the depth of the cavity was measured to be approximately two feet from the downstream face of the ogee section. Visual observations suggest that the cavity was formed by continued deterioration of the old concrete over which a cover of concrete appears to have been placed during the repairs made to the structure in 1963.

The adjacent spillway bay, which includes a steel beam and stop log arrangement as an impounding structure and which also incorporates two spillway gates, was found to have no significant signs of distress. Except for some of the steel crossbar connections, the main structural elements were found to be free of significant corrosion. The spillway gates incorporated into this beam and stop log arrangement consists of steel frames spanned by stop logs. The smaller of the gates which the drawing indicates to be approximately 4 feet wide and 3 feet deep and has its base approximately 3 feet below the normal pool elevation. The gate is supported by hinges at its base and by two tension chains attached to a pulley mechanism at its top. With the extension of the chains, the gate opens downstream. The operation of the small gate was observed. The larger gate, which appears to be approximately 7 feet high and 4 feet wide, hinges from a point about 2 feet above its base with the top rotating downstream. The maintenance personnel reported that due to siltation against the bottom of the gate, this gate cannot be operated.

d. Reservoir Area. A map review indicates that approximately 25 percent of the watershed consists of urban residential areas. It appears that with continued development in the watershed, the siltation problem, which is reported to have existed in the past, will continue to be a problem in the future.

e. Downstream Channel. In a one-half mile reach starting immediately downstream from the dam, Brush Run flows through urban residential areas. In this reach, approximately 1000 feet downstream from the dam, the stream flows under U.S. Route 36. It is estimated that failure of the dam would cause loss of life and property damage. Further description of the downstream conditions is included in Section 1.2(d).

3.2 Evaluation. While the overall condition of the embankment was found to be good, the condition of the spillway structures was assessed to be poor. The concrete in the spillway structures was found to be seriously deteriorated in various locations, raising concern as to its structural integrity. In the gated spillway section, although no apparent structural distress was observed, the configuration of the structure and the manner in which the spillway gates are operated are not considered to be adequate for impounding structures or operating facilities.

SECTION 4
OPERATIONAL FEATURES

4.1 Procedure. There are no formal procedures for the operation and maintenance of the dam. The reservoir is normally maintained at the uncontrolled spillway crest levels with excess inflow discharging over the spillways.

4.2 Maintenance of the Dam. As revealed by the condition of the spillway structures, it appears that the dam has not been adequately maintained since the rehabilitation of the structures in 1963.

4.3 Maintenance of Operating Facilities. The park maintenance personnel reported that no maintenance has been performed on the operating facilities since the rehabilitation of the dam in 1963.

4.4 Warning System. No formal warning system exists for the dam.

4.5 Evaluation. The maintenance condition of the dam and operating facilities are considered to be poor. The condition of the facilities suggests that no continued maintenance is being performed.

SECTION 5
HYDRAULICS AND HYDROLOGY

5.1 Evaluation of Features

a. Design Data. Lakemont Dam has a watershed of 6.2 square miles and impounds a reservoir with a surface area of 13 acres at normal pool level. The flood discharge facilities for the dam consist of two 17-foot-wide overflow sections located beneath a two-span bridge. At maximum pool level, the discharge capacity of the two overflow sections (gates closed in stop log section) is estimated to be 438 cfs and is restricted by the arch of the overhead bridge deck.

b. Experience Data. As previously stated, Lakemont Dam is classified as a small dam in the high hazard category. Under the recommended criteria for evaluating emergency spillway discharge capacity, such impoundments are required to pass half to full PMF.

The PMF inflow hydrograph for the reservoir was determined utilizing the Dam Safety Version of the HEC-1 computer program developed by the Hydrologic Engineering Center of the U.S. Army, Corps of Engineers. The data used for the computer analysis are presented in Appendix D. The one-half PMF and full PMF inflow hydrographs were found to have peak flows of 5197 cfs and 10,397 cfs, respectively. Computer input and a summary of computer output are also included in Appendix D.

c. Visual Observations. The spillway overflow sections are restricted by the overhead bridge deck and may be obstructed by debris during the passage of severe storms. For the following overtopping potential analysis, no reduction in the spillway capacity due to blockage by debris was considered; however, the flood discharge capacity provided by the closed conduit spillways located on each side of the spillway bridge was neglected. During severe storms, these conduits are likely to be blocked by debris and would not provide effective discharge capacity..

d. Overtopping Potential. Various percentages of PMF inflow hydrograph were routed through the reservoir starting from the normal pool elevation using the capacity of the overflow sections only. It was found that the dam can pass less than 5 percent of the PMF without overtopping the embankment. For 50 percent PMF, the dam would be overtopped for a duration of 20 hours with a maximum depth of about 2 feet.

e. Spillway Adequacy. Since the spillway cannot pass the recommended spillway design flood of 50 to 100 percent of the PMF

without overtopping the embankment, the spillway capacity is classified to be inadequate. However, it is not considered to be seriously inadequate because in view of the wide dam crest, overtopping of the dam is not likely to pose significant breach potential. Nevertheless, the need for increasing the spillway capacity and the ability of the embankment to withstand overtopping should be investigated.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability

a. Visual Observations

(1) Embankment. As discussed in Section 3, the field observations did not reveal any distress of the embankment that would significantly affect the stability of the dam. Although no quantitative data are available to aid in the assessment of the stability of the dam, in view of the wide dam crest relative to its height and the fact that the dam has performed adequately in the past, the stability of the dam is considered to be adequate.

(2) Appurtenant Structures. In view of the seriously deteriorated condition of the ogee overflow section, stability of the structure is considered to be marginal.

As discussed in Section 3, the stability of the gated spillway section, which consists of steel beams and stop logs, is also considered to be questionable.

b. Design and Construction Data. No design and construction information is available for the dam.

c. Operating Records. No operating records are kept for the dam.

d. Post-Construction Changes. The only reported post-construction change to the dam was the rehabilitation of the spillway structures in 1963.

e. Seismic Stability. The dam is located in Seismic Zone 1, and based on visual observation, the static stability of the embankment section of the dam is considered to be adequate. Therefore, based on recommended criteria for the evaluation of seismic stability of dams, the structure is presumed to present no hazards from earthquakes.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS/REMEDIAL MEASURES

7.1 Dam Assessment

a. Assessment. The visual observations indicate that Lakemont Dam is in poor condition. Due to severe deterioration of concrete in the spillway overflow section, the structural integrity of the spillway is considered to be questionable; therefore, the dam is considered to be unsafe/nonemergency. Further, the configuration of the stop log structure in the gated spillway section is considered to be unacceptable as a major impounding structure.

In view of the above concerns, it is recommended that the lake be immediately lowered to a level below the point of major structural distress on the ogee overflow section, and then be maintained at that level until the spillway structures are examined by a professional engineer and necessary repairs performed.

The flood discharge capacity of Lakemont Dam was evaluated according to the recommended procedure and was found to pass less than 5 percent of the probable maximum flood (PMF) without overtoppping the the dam. Therefore, according to the recommended criteria, the flood discharge capacity of Lakemont Dam is classified to be inadequate. However, the spillway capacity is not considered to be seriously inadequate because overtopping of the dam, in view of its wide crest width, is not likely to pose a serious breach potential and significantly increase downstream damage. Nevertheless, the need for increasing the spillway capacity and the ability of the embankment to withstand overtopping should be investigated.

b. Adequacy of Information. Available information in conjunction with visual observations is considered to be sufficient to make the following recommendations.

c. Urgency. The following recommendations should be implemented immediately or on a continuing basis.

d. Necessity for Additional Data. It is recommended that the dam be investigated and evaluated by a professional engineer experienced in the design and construction of dams to more accurately ascertain the condition of spillway structures and to develop plans for remedial measures.

7.2 Recommendations and Remedial Measures

1. The owner should immediately retain a professional engineer for detailed evaluation of the spillway structures and prepare and execute plans for repair or replacement of these structures. In the interim, the lake level should be maintained at a level below the major structural distress on the ogee overflow section.

2. In conjunction with the detailed evaluation of the spillway structures, the need for increasing the capacity of the spillway and the ability of the embankment to withstand overtopping should be investigated.

3. Around-the-clock surveillance should be provided during unusually heavy runoff and a formal warning system should be developed to alert the downstream residents in the event of emergencies.

4. The dam and appurtenant structures should be inspected regularly and necessary maintenance performed.

APPENDIX A

CHECKLIST
VISUAL INSPECTION
PHASE I

APPENDIX A

CHECKLIST
VISUAL INSPECTION
PHASE I

NAME OF DAM Lakemont COUNTY Blair STATE Pennsylvania ID# NDI I.D. PA-528 DER I.D. 7-15

TYPE OF DAM Earth HAZARD CATEGORY High

DATE(S) INSPECTION December 5, 1979 WEATHER Sunny TEMPERATURE 40s

POOL ELEVATION AT TIME OF INSPECTION 1006 M.S.L. TAILWATER AT TIME OF INSPECTION 997+ M.S.L.

INSPECTION PERSONNEL:

B. Erel

W. T. Chan

REVIEW INSPECTION PERSONNEL:
(December 12, 1979)

L. D. Andersen

J. H. Poellot

B. Erel

B. Erel RECORDER

VISUAL INSPECTION
PHASE I
EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None	
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None	
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	There are erosion ditches on each side of the spillway bridge.	Erosion ditches should be filled.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	No major irregularities. See Plate 5 for dam crest profile.	
RIPRAP FAILURES	There is no riprap on the upstream face of the dam.	Need for placing erosion protection on the upstream face of the dam should be considered.

VISUAL INSPECTION
PHASE I
EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
JUNCTION OF EMBANKMENT AND ABUTMENT, SPILLWAY AND DAM	No signs of distress.	
ANY NOTICEABLE SEEPAGE	None	
STAFF GAGE AND RECORDER	None	
DRAINS	None	

VISUAL INSPECTION
PHASE I
OUTLET WORKS

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CRACKING AND SPALLING OF CONCRETE SURFACES IN OUTLET CONDUIT	(The dam has no low-level outlet works.)	
INTAKE STRUCTURE	Not applicable	
OUTLET STRUCTURE	Not applicable	
OUTLET CHANNEL	Not applicable	
EMERGENCY GATE	A spillway gate serves as an emergency gate. This gate is not operational.	

VISUAL INSPECTION
PHASE I
UNGATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE WEIR	The concrete in the overflow section has seriously deteriorated. There is a cavity on the downstream face of the ogee section for the entire 17-foot length of the overflow section.	Structural integrity of this structure should be investigated.
APPROACH CHANNEL	Partially obstructed by debris.	Debris from the approach channel should be periodically removed.
DISCHARGE CHANNEL	A concrete channel and plunge pool. In fair condition.	
BRIDGE AND PIERS	There is a bridge over the control section, maximum vertical clearance is approximately 2 feet.	

VISUAL INSPECTION
PHASE I
GATED SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONCRETE SILL	(Gated spillway section consists of a beam and stop log arrangement structure.)	
APPROACH CHANNEL	Partially blocked by debris.	Debris from the approach channel should be periodically cleared.
DISCHARGE CHANNEL	Concrete channel and plunge pool in fair condition.	
BRIDGE PIERS	There is a bridge over the gated spillway section which provides a vertical clearance of approximately 2 feet.	
GATES AND OPERATION EQUIPMENT	Of the two spillway gates, the operation of the smaller gate was observed. The maintenance condition of the operating equipment is considered to be poor.	

VISUAL INSPECTION
PHASE I
INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
MONUMENTATION/SURVEYS	None	
OBSERVATION WELLS	None	
WEIRS	None	
PIEZOMETERS	None	
OTHER	None	

VISUAL INSPECTION
PHASE I
RESERVOIR

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Reservoir slopes are gentle. No significant shoreline erosion was noted.	
SEDIMENTATION	The owner reported that the reservoir has significantly silted and the average depth is on the order of 4 feet.	
UPSTREAM RESERVOIRS	None	

VISUAL INSPECTION
PHASE I
DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	Box culvert with two 5-foot by 10-foot openings is located approximately 100 feet downstream from the spillway section.	
SLOPES	No significant erosion.	
APPROXIMATE NUMBER OF HOMES AND POPULATION	In a one-half mile reach downstream from the dam, Brush Run flows through residential areas. Population: Approximately 100	

APPENDIX B

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
AND HYDROLOGIC AND HYDRAULIC
PHASE I

APPENDIX B

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

NAME OF DAM Lakemont
ID# NDI I.D. PA-528
DER I.D. 7-15

ITEM	REMARKS
AS-BUILT DRAWINGS	Not applicable
REGIONAL VICINITY MAP	See Plate 1.
CONSTRUCTION HISTORY	Reportedly, the dam was constructed in the late 1890s by Altoona and Logan Valley Electric Railway Company.
TYPICAL SECTIONS OF DAM	Not applicable
OUTLETS - PLAN - DETAILS - CONSTRAINTS - DISCHARGE RATINGS	See Plates 2 and 3.

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

ITEM	REMARKS
RAINFALL/RESERVOIR RECORDS	Not recorded
DESIGN REPORTS	None available
GEOLOGY REPORTS	None available
DESIGN COMPUTATIONS HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None available
MATERIALS INVESTIGATIONS BORING RECORDS LABORATORY FIELD	None available

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

ITEM	REMARKS
POST CONSTRUCTION SURVEYS OF DAM	None reported
BORROW SOURCES	Unknown
MONITORING SYSTEMS	None
MODIFICATIONS	The spillway structures were rehabilitated in 1963.
HIGH POOL RECORDS	Not formally recorded. The owner reported that the highest pool level occurred during the 1936 flood.

CHECKLIST
ENGINEERING DATA
DESIGN, CONSTRUCTION, OPERATION
PHASE I

ITEM	REMARKS
POST CONSTRUCTION ENGINEERING STUDIES AND REPORTS	None reported
PRIOR ACCIDENTS OR FAILURE OF DAM DESCRIPTION REPORTS	It is reported that the dam was overtopped during the 1936 flood.
MAINTENANCE OPERATION RECORDS	Not maintained
SPILLWAY PLAN SECTIONS DETAILS	See Plates 2 and 3.
OPERATING EQUIPMENT PLANS AND DETAILS	Not available

CHECKLIST
ENGINEERING DATA
HYDROLOGIC AND HYDRAULIC

DRAINAGE AREA CHARACTERISTICS: 6 square miles

ELEVATION; TOP NORMAL POOL AND STORAGE CAPACITY: 1006 (26 acre-feet)

ELEVATION; TOP FLOOD CONTROL POOL AND STORAGE CAPACITY: 1008.5 (93+)

ELEVATION; MAXIMUM DESIGN POOL: 1009.3 (top of bridge deck)

ELEVATION; TOP DAM: 1008.5 (measured low spot)

SPILLWAY: (Uncontrolled Overflow Section)

a. Elevation 1006

b. Type Ogee overflow section

c. Width 17 feet (perpendicular to flow)

d. Length Not applicable

e. Location Spillover Adjacent to spillway bridge

f. Number and Type of Gates Two manually operated spillway gates

OUTLET WORKS:

a. Type (The dam has no low-level outlet works)

b. Location Not applicable

c. Entrance Inverts Not applicable

d. Exit Inverts Not applicable

e. Emergency Drawdown Facilities Not applicable

HYDROMETEOROLOGICAL GAGES:

a. Type None

b. Location None

c. Records None

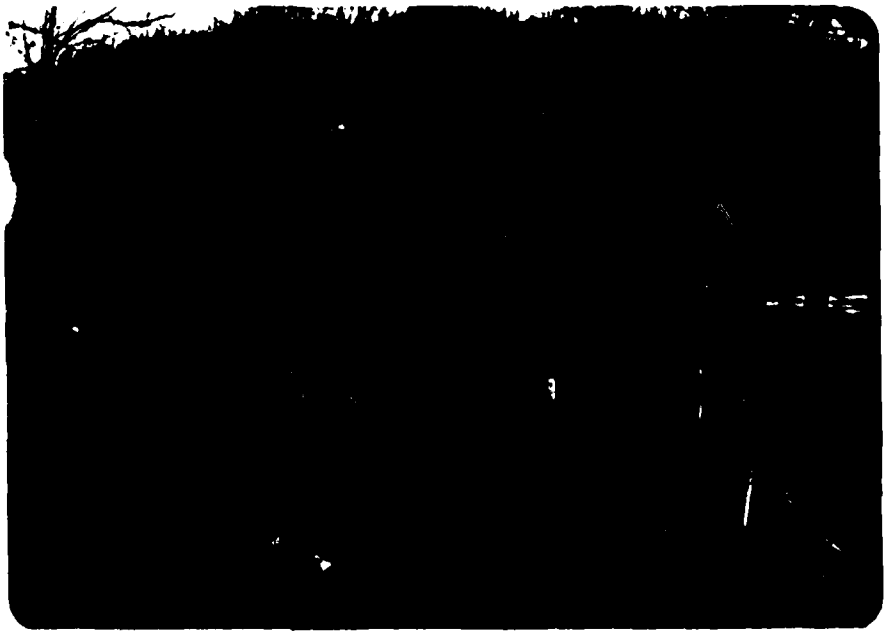
MAXIMUM NONDAMAGING DISCHARGE: Spillway capacity (+44 cfs)

APPENDIX C

PHOTOGRAPHS

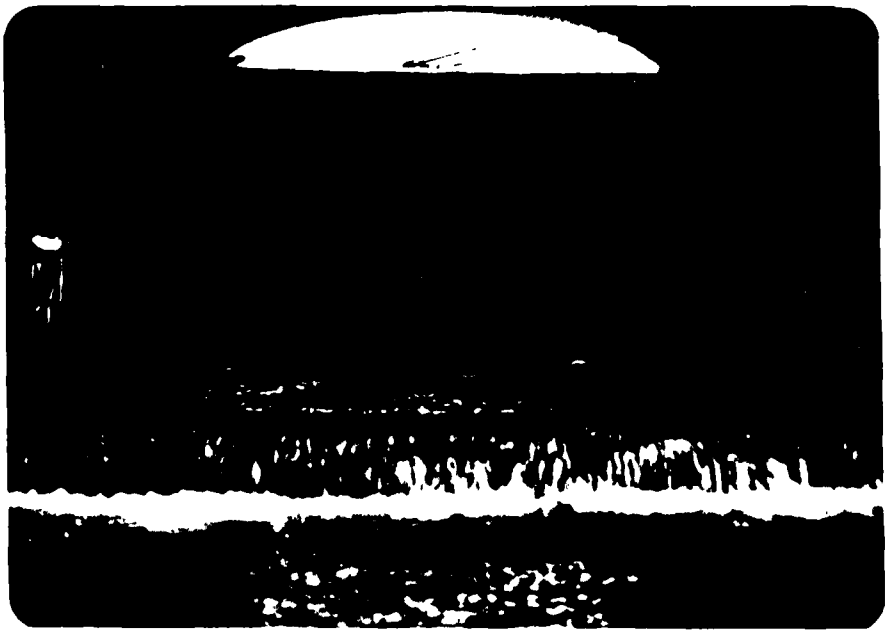
LIST OF PHOTOGRAPHS
LAKEMONT DAM
NDI I.D. PA-528
DECEMBER 5, 1979

PHOTOGRAPH NO.	DESCRIPTION
1	Dam crest, looking west.
2	Spillway crest, looking upstream.
3	Wooden sluice gate, looking upstream.
4	An 18-inch-deep cavity extending across the ogee spillway on the downstream face.
5	Two 10-foot by 5-foot culverts across the spillway discharge channel. Note homes along the discharge channel.
6	Downstream conditions: 0.1 mile from dam.



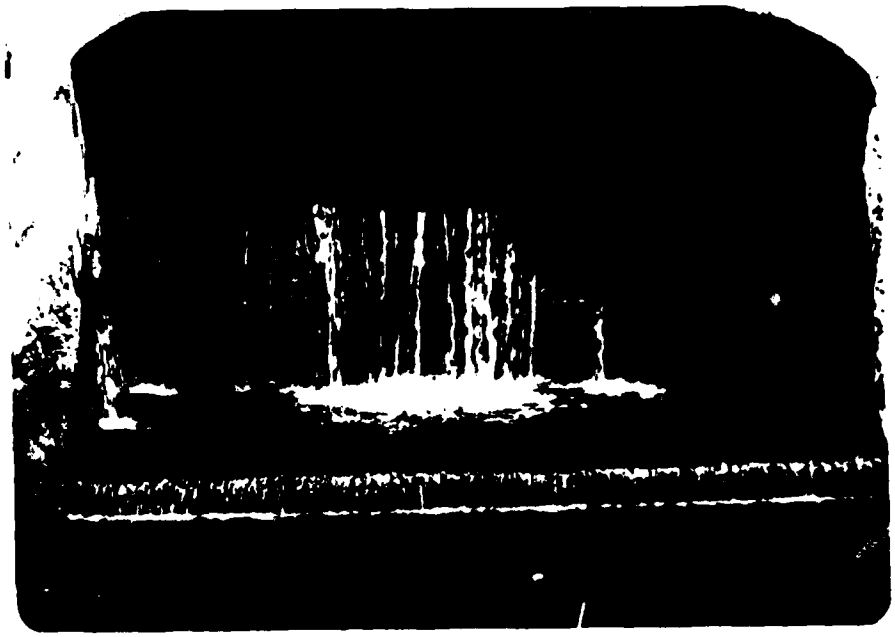
Photograph No. 1

Dam crest, looking west.



Photograph No. 2

Spillway crest, looking upstream.



Photograph No. 3

Wooden sluice gate, looking upstream.

Photograph No. 4

An 18-inch-deep cavity extending across the ogee spillway on the downstream face.

Photograph No. 5

Two 10-foot by 5-foot culverts across the spillway discharge channel. Note homes along the discharge channel.

Photograph No. 6

Downstream conditions: 0.1 mile from dam.

APPENDIX D

HYDROLOGY AND HYDRAULICS ANALYSES

HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: Lakemont Dam (NDI - I.D. PA 528)

PROBABLE MAXIMUM PRECIPITATION (PMP) = 23.6 INCHES/24 HOURS[1]

STATION	1	2	3	4	5
Station Description	Lake	Dam			
Drainage Area (square miles)	6.23	-			
Cumulative Drainage Area (square miles)	6.23	6.23			
Adjustment of PMF for Drainage Area (%)[2]					
6 Hours	102	-			
12 Hours	120				
24 Hours	130				
48 Hours	140				
72 Hours	-				
Snyder Hydrograph Parameters					
Zone[3]	21	-			
C_p/C_t[4]	0.55/1.5				
L (miles)[5]	5.0				
L_{ca} (miles)[5]	3.2				
$t_p = C_t(L \cdot L_{ca})^{0.3}$ (hours)	3.45				
Spillway Data					
Crest Length (ft)	-	36			
Freeboard (ft)		2.5			
Discharge Coefficient		3.26			
Exponent		1.5			

(1) Hydrometeorological Report 33 (Figure 1), U.S. Army, Corps of Engineers, 1956.

(2) Hydrometeorological Report 33 (Figure 2), U.S. Army, Corps of Engineers, 1956.

(3) Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients (C_p and C_t).

(4) Snyder's Coefficients.

(5) L = Length of longest water course from outlet to basin divide.
L_{ca} = Length of water course from outlet to point opposite the centroid of drainage area.

STORAGE VS. ELEVATION

ELEVATION	ΔH, FEET	AREA (ACRES)[1]	ΔVOLUME (ACRE-FEET)[2]	STORAGE (ACRE-FEET)
1010		44.1		403.1
	14		377.3	
1006		12.9		25.8
	6[3]		25.8[4]	
1000		0		0

(1) Planimetered from USGS maps.

(2) ΔVolume = $\Delta H/3\ (A_1 + A_2 + \sqrt{A_1 A_2})$.

(3) Maximum depth estimated by owner, average depth = 2'+.

(4) From PennDER files.

```
**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION     JULY 1978
  LAST MODIFICATION  26 FEB 79
**********
    1                A1       SNYDER UNIT HYDROGRAPH,FLOOD ROUTING AND DAM OVERTOPPING ANALYSES
    2                A2       LAKEMONT DAM,BLAIR COUNTY. NDI-I.D.PA.528        PROJECT NO.79-543-C5
    3                A3       FOR 5%,10%,15%,20%,30%,40%,50%,80%,AND 100% PMF
    4                B    300        0       20        0        0        0        0        0       -4        0
    5                B1     5
    6                J      1        9        1
    7                J1  0.05     0.10     0.15     0.20     0.30     0.40     0.50     0.80     1.00
    8                K      0        1                                          1
    9                K1       CALCULATION OF SNYDER INFLOW HYDROGRAPH TO LAKEMONT PARK LAKE
   10                M      1        1     6.23              6.23                                    1
   11                P              23.6      102      120      130      140
   12                T                                                    1.0      .05           0.0032
   13                W   3.45     0.55
   14                X   -1.0    -0.05      2.0
   15                K      1        2                                          1
   16                K1       ROUTING FLOW THROUGH LAKEMONT DAM (NDI-I.D.PA.528)
   17                Y                                          1        1
   18                Y1     1                                                -1006.0
   19                SS   0.0     25.8    403.1
   20                SE1000.0  1006.0  1020.0
   21                SS1006.0     34.0     3.26      1.5
   22                SD1008.5      3.08     1.5    500.0
   23                SL 300.0    350.0    400.0    500.0
   24                SV1008.5  1008.6  1008.8  1009.3
   25                K     99
```

COMPUTER INPUT OVERTOPPING ANALYSIS

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .05	RATIO 2 .10	RATIO 3 .15	RATIO 4 .20	RATIO 5 .30	RATIO 6 .40	RATIO 7 .50	RATIO 8 .80	RATIO 9 1.00
HYDROGRAPH AT	1	6.23	1	520.	1039.	1559.	2079.	3118.	4157.	5197.	8315.	10393.
		(16.14)		(14.72)(	29.43)(	44.15)(	58.86)(	88.29)(	117.72)(	147.15)(	235.44)(	294.30)
ROUTED TO	2	6.23	1	479.	1032.	1552.	2072.	3111.	4150.	5190.	8307.	10385.
		(16.14)		(13.58)(	29.23)(	43.96)(	58.68)(	88.11)(	117.53)(	146.95)(	235.22)(	294.07)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1006.00	1006.00	1006.50
STORAGE	26.	26.	93.
OUTFLOW	0.	0.	438.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.05	1008.58	.08	95.	479.	2.00	44.00	0.00
.10	1009.03	.53	108.	1032.	7.33	43.33	0.00
.15	1009.31	.81	115.	1552.	10.33	43.00	0.00
.20	1009.53	1.03	121.	2072.	12.67	43.00	0.00
.30	1009.91	1.41	131.	3111.	15.67	43.00	0.00
.40	1010.25	1.75	140.	4150.	18.33	43.00	0.00
.50	1010.55	2.05	148.	5190.	20.33	43.00	0.00
.80	1011.35	2.85	170.	8307.	23.33	43.00	0.00
1.00	1011.83	3.33	183.	10385.	25.00	43.00	0.00

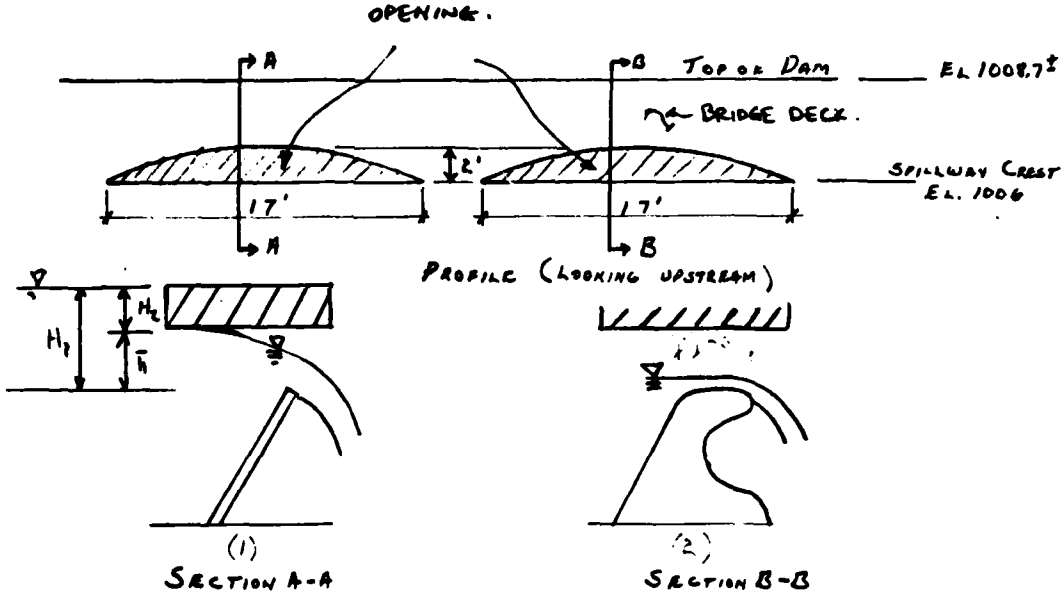
OVERTOPPING ANALYSIS SUMMARY

D'APPOLONIA
CONSULTING ENGINEERS, INC

By MB Date 12/12/79 Subject LAKEMONT DAM Sheet No. 1 of 3
Chkd. By WJC Date 12/12/79 SPILLWAY RATING Proj. No. 79-543-05

SPILLWAY CAPACITY

THE RESULTS OF A DEC. 5, 1979 FIELD INSPECTION INDICATE THE SPILLWAYS ARE AS SHOWN BELOW.



FIND EQUIVALENT $\bar{h}$ TO TREAT SPILLWAY AS A RECTANGULAR OPENING.

$$r = \frac{4(\overline{BD})^2 + (A\overline{A}_C)^2}{8(\overline{BD})}$$

$$= \frac{4(2)^2 + (17)^2}{8(2)}$$

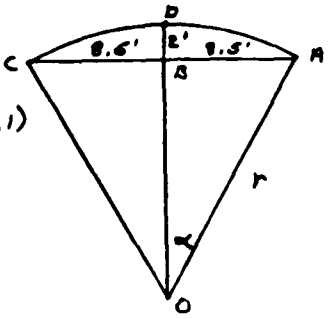
$$r = 19.1'$$

D'APPOLONIA
CONSULTING ENGINEERS, INC.

By MB Date 12/12/79 Subject LAKEMONT DAM Sheet No. 2 of 3
Chkd. By WTK Date 12/12/79 SPILLWAY RATING Proj. No. 79-593-05

$\sin \alpha = 8.5/19.1$
$\alpha = 26.48°$
$2\alpha = 52.96°$

$OB = \cos\alpha\,(19.1)$
$= 17.1'$



AREA $OADC = \pi r^2 \frac{2\alpha}{360°}$
$= \pi (19.1)^2 (52.96/360)$
$= 169.35\ ft^2$

AREA $OABC = (OB)(AB)$
$= (17.1)(8.5')$
$= 145.03\ ft^2$

AREA $ABCD = OADC - OABC = L\bar{h}$
$= 169.35 - 145.03 = 22.92 = 17\bar{h}$
$\bar{h} = 1.35'$

USE ORIFICE FORMULA $d = \bar{h} = 1.35$
FOR SPILLWAY 1

$$Q_1 = \tfrac{2}{3}\sqrt{2g}\, C_1 L (H_1^{3/2} - H_2^{3/2})$$

REF. P. 386 "DESIGN OF SMALL DAMS"

FOR SPILLWAY 2

$$Q_2 = \tfrac{2}{3}\sqrt{2g}\, C_1 L (H_1^{3/2} - H_2^{3/2})$$

COMBINED

$$Q_T = \tfrac{2}{3}\sqrt{2g}\, C_1 L_T (H_1^{1.5} - H_2^{1.5})$$

WHERE $H_2/H_1 = 0.50$
$\therefore C_1 = 0.667$
FROM FIG. 267, PG 386, "DESIGN OF SMALL DAMS"

$L_T = 34'$,
$H_1 = 2.7'$
$H_2 = 1.35'$

D'APPOLONIA
CONSULTING ENGINEERS, INC.

By CMB Date 12/12/79 Subject LAKEMONT DAM Sheet No. 3 of 3
Chkd. By NIC Date 12/12/79 SPILLWAY RATING Proj. No. 79-543-05

$$Q_T = 2/3\,(2)\left(\sqrt{32.2}\right)(0.667)(34.0)\left(2.7^{1.5} - 1.35^{1.5}\right)$$

$$= 492 \text{ cfs.}$$

FOR HEC-1 INPUT CALCULATE EFFECTIVE COEFFICIENT FOR WEIR FORMULA :-

$$Q_T = 492 = C\,L\,H^{1.5}$$

WHERE $L = 34$ ft & $H = 2.7$ ft.

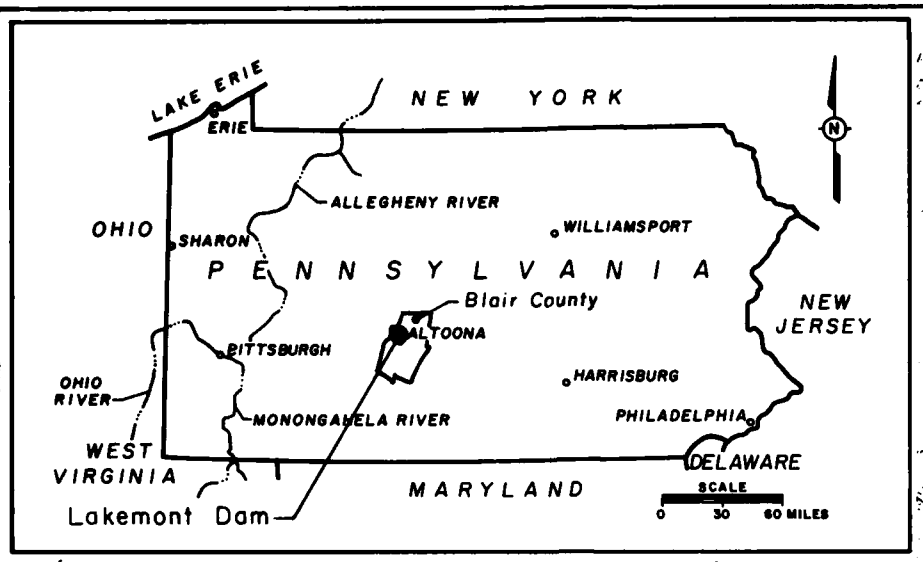
$$C = \frac{L H^{1.5}}{Q_T} = \frac{34 \times 2.7^{1.5}}{492}$$

$$= \underline{\underline{3.26}}$$

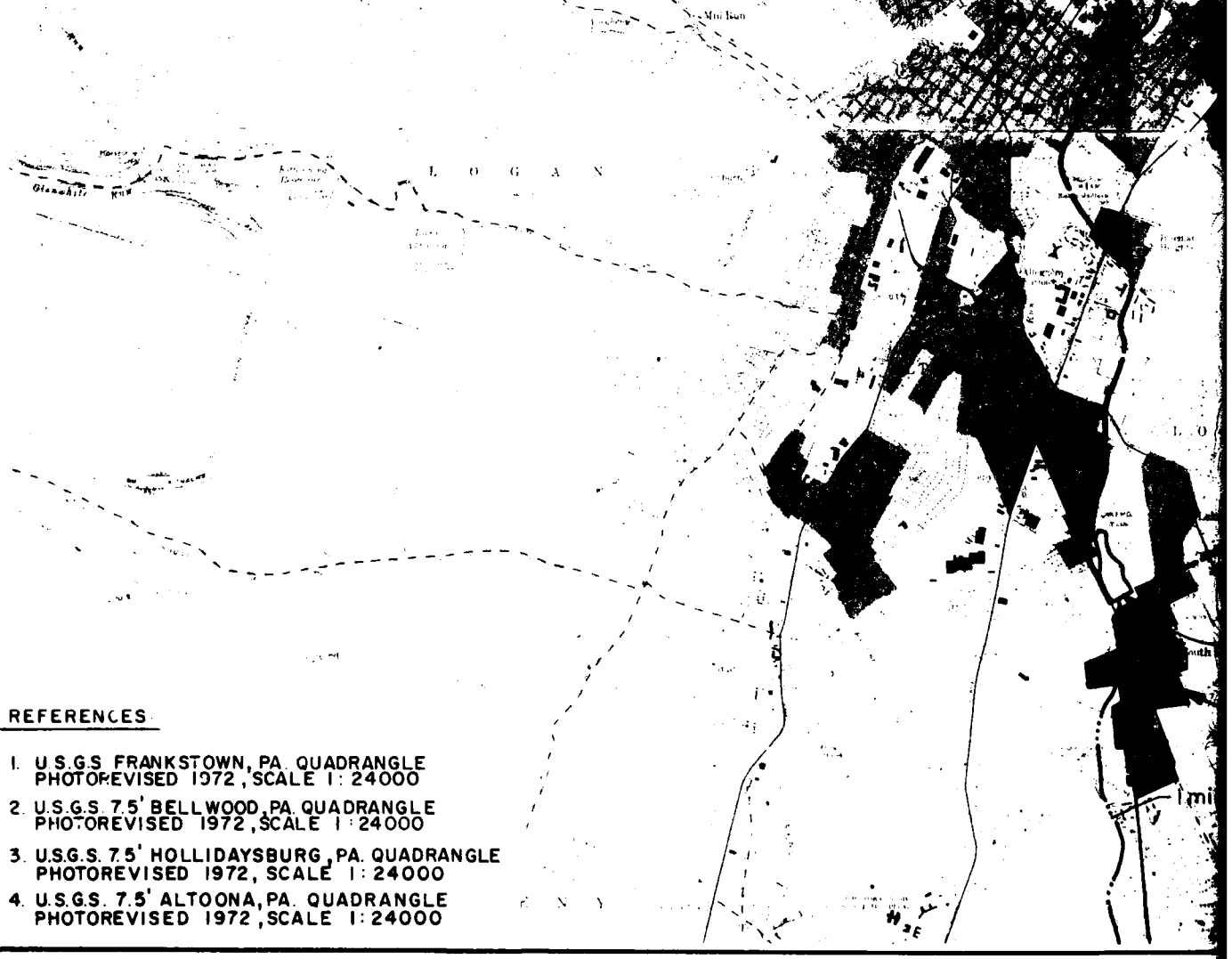
APPENDIX E

PLATES

DRAWN BY	ACS	CHECKED BY	BE	DRAWING NUMBER	79-543-B1
	11-14-79	APPROVED BY	MD		1/4/80



KEY PLAN



REFERENCES

1. U.S.G.S. FRANKSTOWN, PA. QUADRANGLE PHOTOREVISED 1972, SCALE 1:24000
2. U.S.G.S. 7.5' BELLWOOD, PA. QUADRANGLE PHOTOREVISED 1972, SCALE 1:24000
3. U.S.G.S. 7.5' HOLLIDAYSBURG, PA. QUADRANGLE PHOTOREVISED 1972, SCALE 1:24000
4. U.S.G.S. 7.5' ALTOONA, PA. QUADRANGLE PHOTOREVISED 1972, SCALE 1:24000

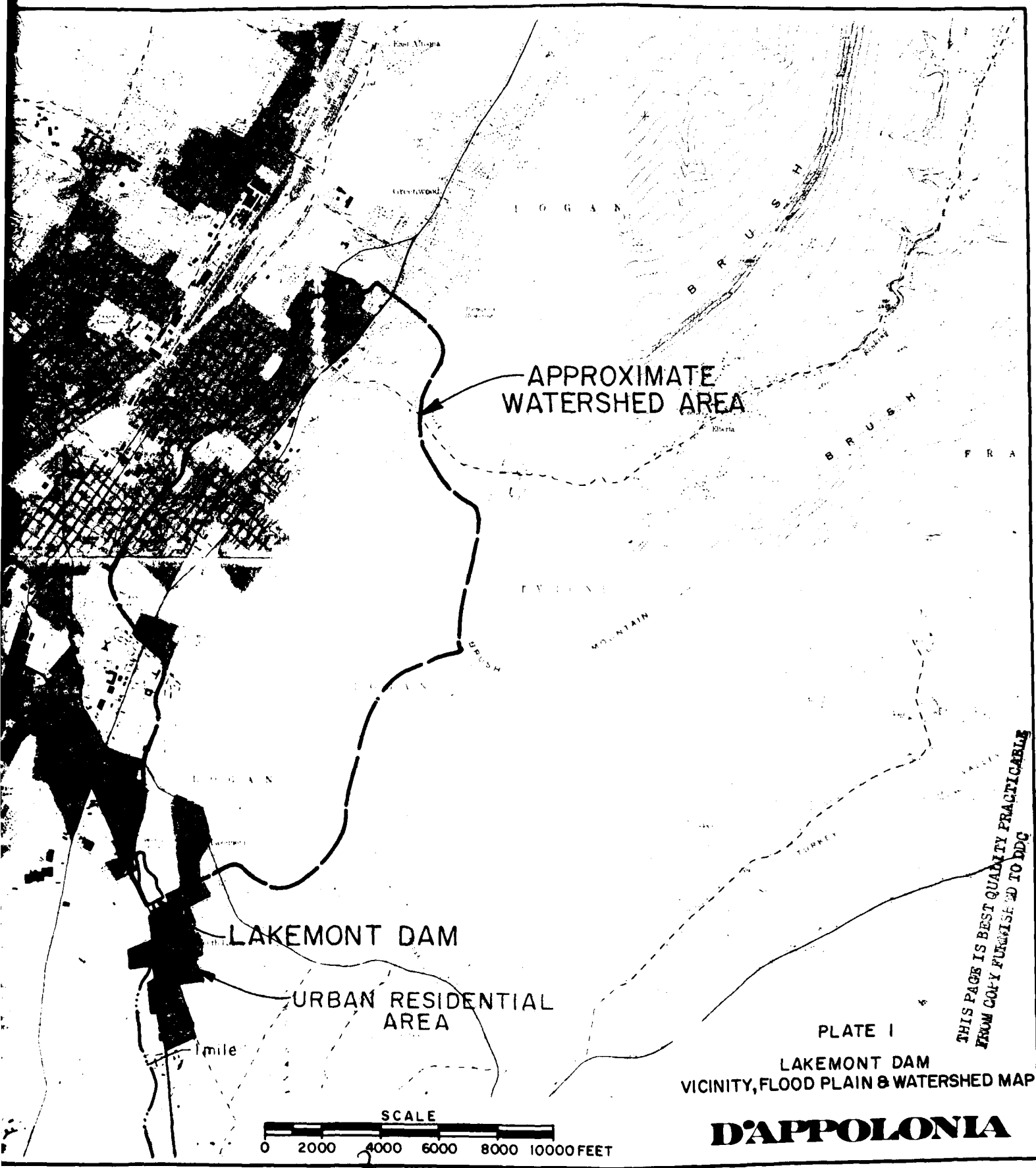


PLATE 1

LAKEMONT DAM
VICINITY, FLOOD PLAIN & WATERSHED MAP

D'APPOLONIA

DRAWN BY	ACS	CHECKED BY	BE	DRAWING NUMBER	79-043-B2
	12-31-79	APPROVED BY	JMP		

NORTH ELEVATION (UP

SECTION A-A

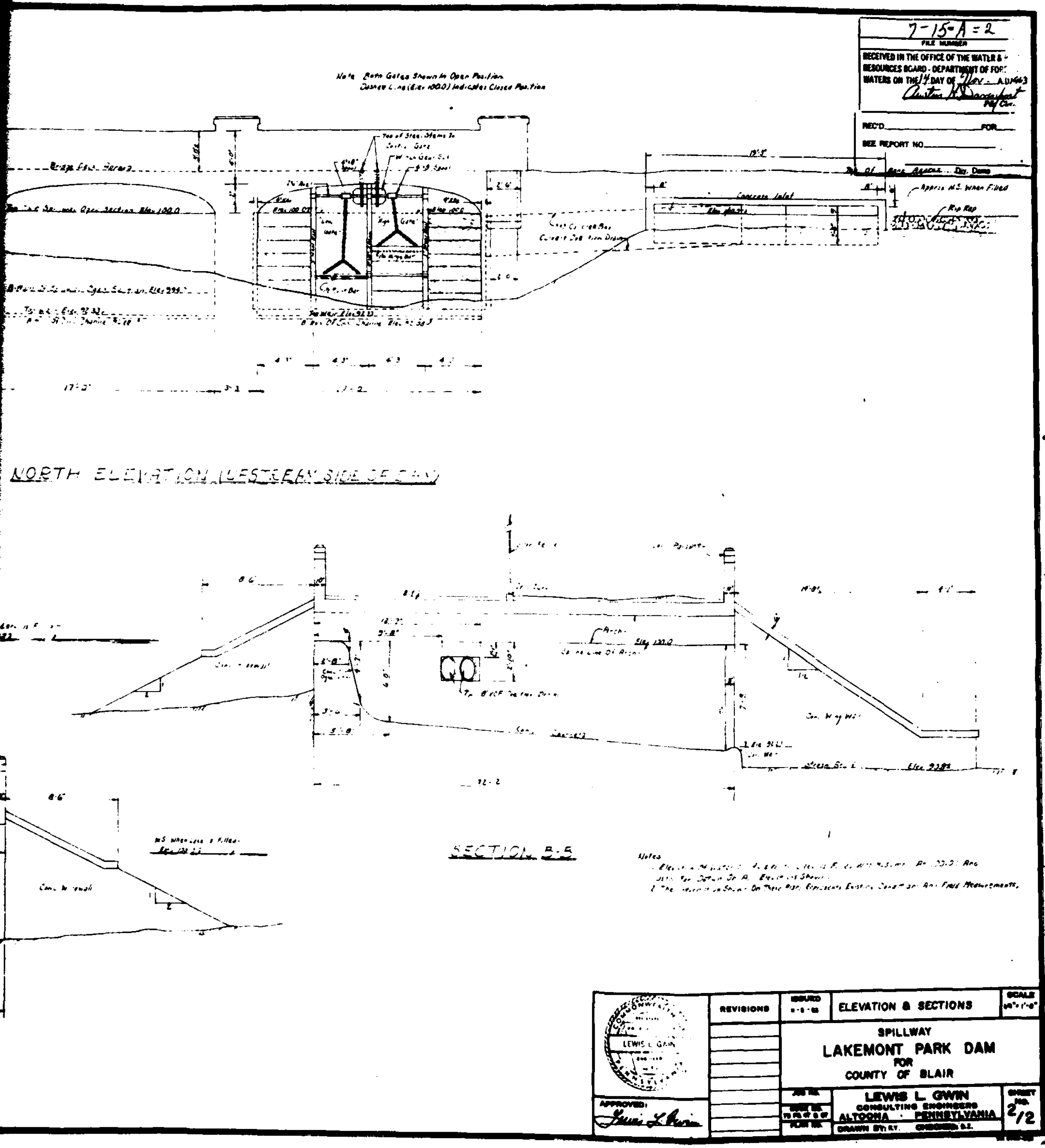


PLATE 2

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2

D'APPOLONIA

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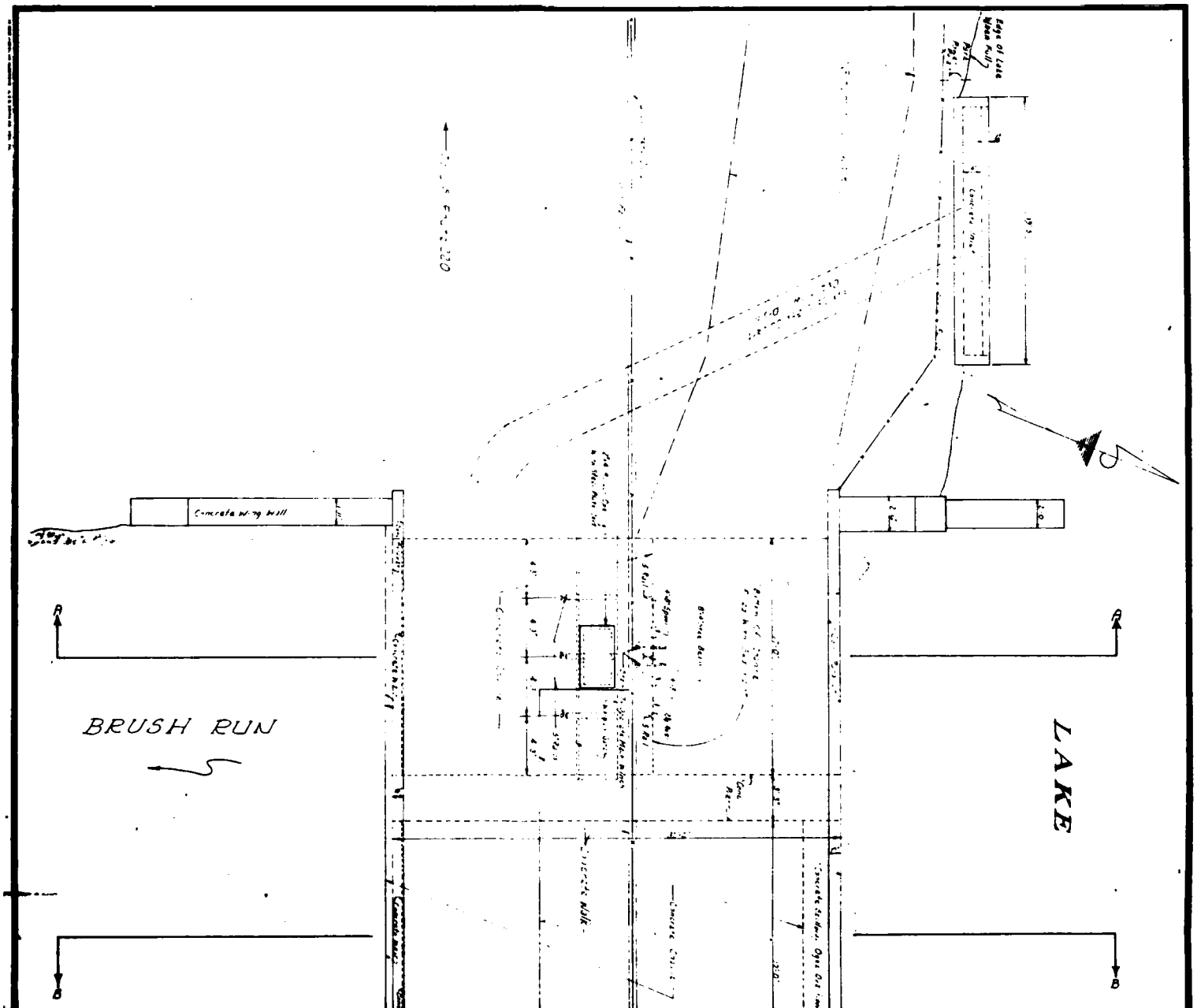
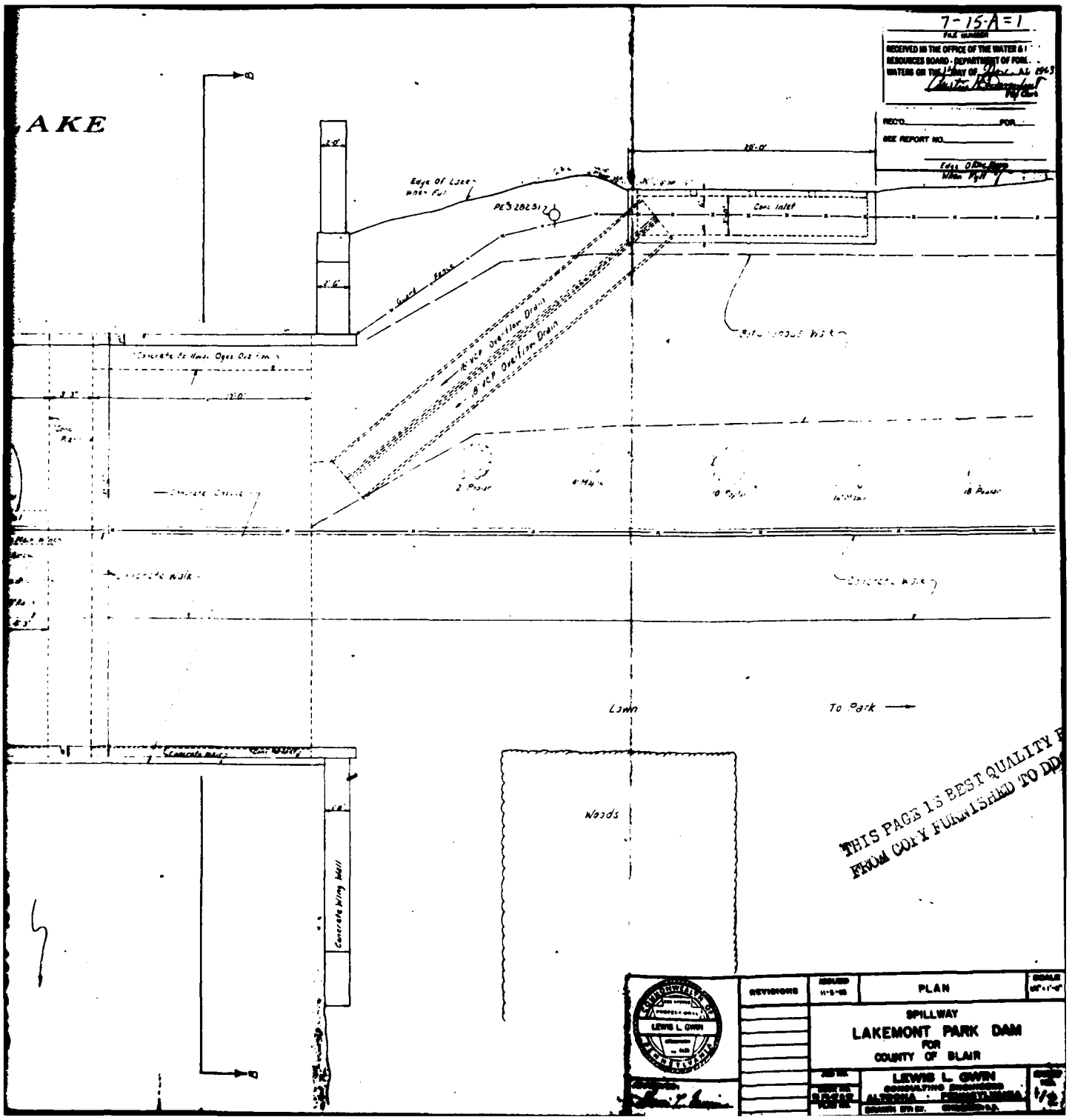
	12-31-79	APPROVED BY	[illegible]	1/4/80		




AKE
7-15-A=1
RECEIVED IN THE OFFICE OF THE WATER & I
RESOURCES BOARD - DEPARTMENT OF FORE
WATERS ON THE
REC'D FOR
SEE REPORT NO.
Edge Of Lake When Full
Conc. Inlet
Concrete Weir
Lawn
To Park
Woods
Concrete Wing Wall
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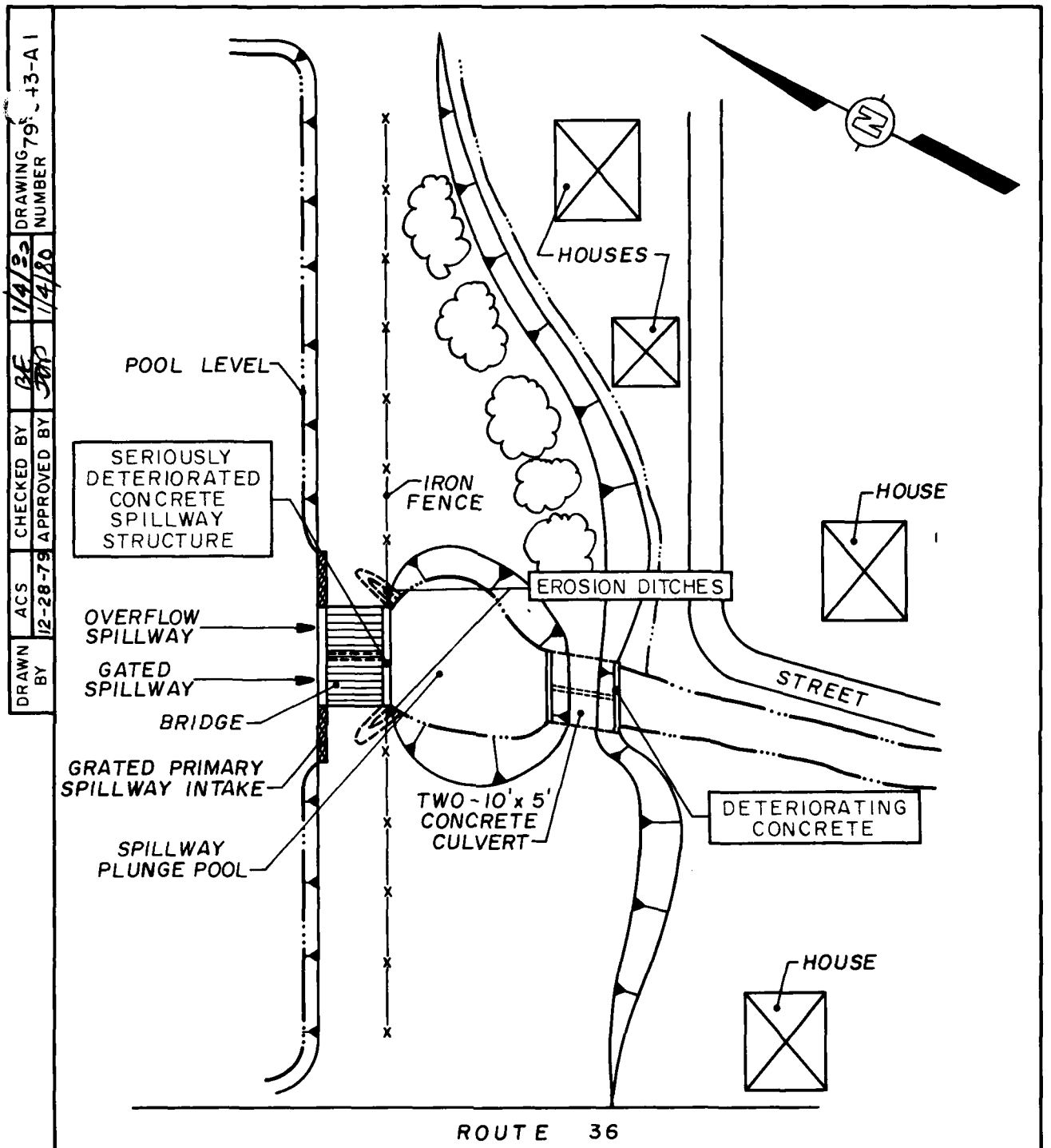
REVISIONS
PLAN
SPILLWAY
LAKEMONT PARK DAM
FOR
COUNTY OF BLAIR
LEWIS L. GWIN
CONSULTING ENGINEERS
ALTOONA PENNSYLVANIA



NOTES:

1. POOL LEVEL DATE OF INSPECTION: 0.2 FT. ABOVE OVERFLOW SPILLWAY CREST.

NOT TO SCALE

PLATE 4

LAKEMONT DAM
GENERAL PLAN
FIELD INSPECTION NOTES
FIELD INSPECTION DATE: DEC. 5, 1979

D'APPOLONIA

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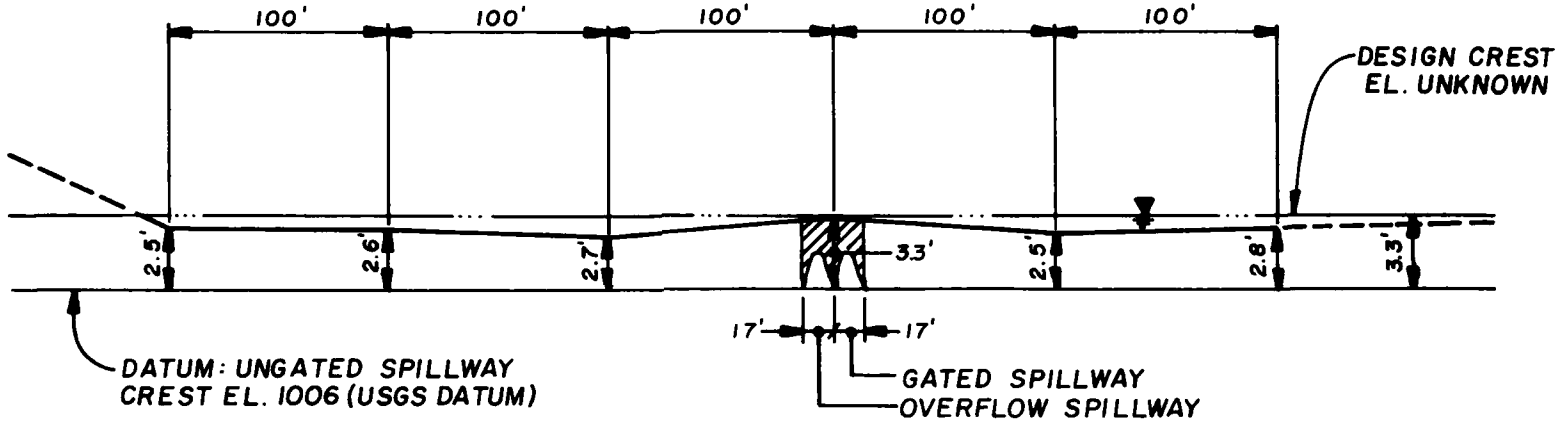
	12-31-79	APPROVED BY	[illegible]	1/4/80		



DAM CREST PROFILE
(LOOKING DOWNSTREAM)

NOTES:

1. DAM CREST IS SURVEYED RELATIVE TO SPILLWAY CREST LEVEL
2. DATUM ELEVATION PER ELEVATION SHOWN ON U.S.G.S., HOLIDAYSBURG 7.5 MIN. QUAD. PHOTO REVISED 1972.

PLATE 5

LAKEMONT DAM
DAM CREST SURVEY
FIELD INSPECTION DATE: DEC. 5, 1979

D'APPOLONIA

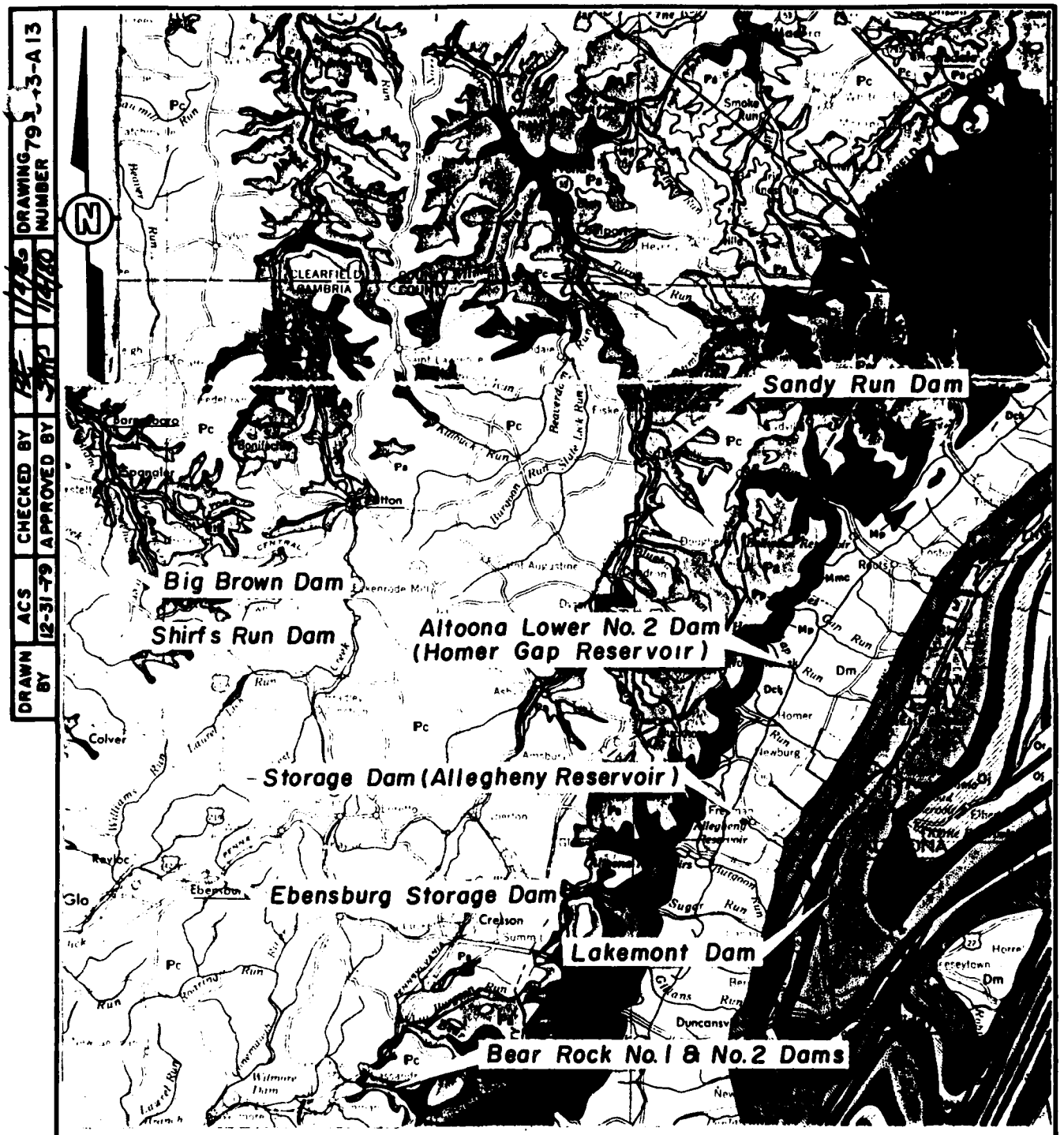
APPENDIX F

REGIONAL GEOLOGY

APPENDIX F

REGIONAL GEOLOGY
LAKEMONT DAM

Lakemont Dam is situated on the tapering nose of the Sinking Valley anticline which plunges to the southwest. Strata at the site are of Silurian Age and belong to the Rose Hill Formation (Clinton Group) and the Bloomsburg Formation. The Rose Hill Formation is a greenish-gray thin to medium bedded shale with interbedded siltstone and sandstone layers. The Bloomsburg Formation lies above the Rose Hill Formation and is composed by red shale and siltstone with local beds of sandstone and limestone.



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	12-31-79	APPROVED BY			

SCALE

0 2 4 6 8 10 miles

REFERENCE:

GEOLOGIC MAP OF PENNSYLVANIA PREPARED BY COMMONWEALTH OF PENNA., DEPT. OF INTERNAL AFFAIRS, DATED 1960, SCALE 1" = 4 MILES

SANDY RUN, BIG BROWN, SHIRFS RUN EBENSBURG STORAGE, LAKEMONT, BEAR ROCK NO. 1 AND NO. 2 DAMS, (ALLEGHENY RESERVOIR) STORAGE DAM AND ALTOONA LOWER NO. 2 (HOMER GAP RESERVOIR)

GEOLOGY MAP

D'APPOLONIA

DRAWN BY	ACS	CHECKED BY		DRAWING NUMBER 79-43-A18
	12-31-79	APPROVED BY		

LEGEND:

Pc

Conemaugh Formation

Cyclic sequences of red and gray shale and siltstones with thin limestones and coals; massive Mahoning Sandstone commonly present at base; Ames Limestone present in middle of sections; Brush Creek Limestone in lower part of section.

Pottaville Group

Light gray to white, coarse grained sandstones and conglomerates with some mineable coal; includes Sharp Mountain, Schuylkill, and Tumbling Run Formations.

Allegheny Group

Cyclic sequences of sandstone, shale, limestone and coal; numerous commercial coals; limestones thicken westward; Vanport Limestone in lower part of section; includes Freeport, Kittanning, and Clarion Formations.

Clinton Group

Predominantly Rose Hill Formation - Reddish purple to greenish gray, thin to medium bedded, fossiliferous shale with interfingering "iron sandstones" and local gray, fossiliferous limestone; above the Rose Hill is brown to white quartzitic sandstone (Keefer) interbedded upward with dark gray shale (Rochester).

Dm

Marine beds

Gray to olive brown shales, graywackes, and sandstones; contains "Chemung" beds and "Portage" beds including Burket, Brallier, Harrell, and Trimmers Rock; Tully Limestone at base.

Pocono Group

Predominantly gray, hard, massive, cross-bedded conglomerate and sandstone with some shale, includes in the Appalachian Plateau Burgoon, Shenango, Cuyahoga, Cussewago, Corry, and Knapp Formations, includes part of "Oswayo" of M. L. Fuller in Potter and Tioga counties.

Oriskany Formation

White to brown, fine to coarse grained, partly calcareous, locally conglomeratic, fossiliferous sandstone (Ridgley) at the top; dark gray, cherty limestone with some interbedded shales and sandstones below (Shriver).

Marcellus Formation

Black, fissile, carbonaceous shale with thick, brown sandstone (Turkey Ridge) in parts of central Pennsylvania.

Onondaga Formation

Greenish blue, thin bedded shale and dark blue to black, medium bedded limestone with shale predominant in most places; includes Selinsgrove Limestone and Needmore Shale in central Pennsylvania and Buttermilk Falls Limestone and Esopus Shale in easternmost Pennsylvania; in Lehigh Gap area includes Palmerton Sandstone and Bowmanstown Chert.

Dmo

Wills Creek Formation

Greenish gray, thin bedded, fissile shale with local limestone and sandstone zones; contains red shale and siltstone in the lower part.

Bloomsburg Formation

Red, thin and thick bedded shale and siltstone with local units of sandstone and thin impure limestone, some green shale in places.

McKenzie Formation

Greenish gray, thin bedded shale interbedded with gray, thin bedded, fossiliferous limestone, shale predominant at the base; intraformational breccia in the lower part. Absent in Harrisburg quadrangle and to the east.

Keyser Formation

Dark gray, highly fossiliferous, thick bedded, crystalline to nodular limestone; passes into Manlius, Rondout, and Decker Formations in the east.

Tonoloway Formation

Gray, highly laminated, thin bedded, argillaceous limestone; passes into Honeyedville and Pozono Island beds in the east.

Dch

Catskill Formation

Chiefly red to brownish shales and sandstones, includes gray and greenish sandstone tongues named Elk Mountain, Honesdale, Shohola, and Delaware River in the east.

REFERENCE:

GEOLOGIC MAP OF PENNSYLVANIA PREPARED BY COMMONWEALTH OF PENNA. DEPT. OF INTERNAL AFFAIRS, DATED 1960, SCALE 1" = 4 MILES

GEOLOGY MAP LEGEND

D'APPOLONIA